What is claimed is:

1. A semiconductor manufacturing apparatus comprising:

a peeling mechanism to peel a pressure sensitive adhesive (PSA) tape from a semiconductor wafer constituted by a plurality of semiconductor chips which are separated therefrom, the semiconductor wafer having an element formation surface to form an element thereon and a rear surface opposite to the element formation surface, the PSA tape adhering to the element formation surface of the semiconductor wafer, each of the semiconductor chips having an adhesive layer formed on the rear surface;

wherein said peeling mechanism has a sucking section which have a porous member to hold the semiconductor wafer by suction, said porous member being segmented into at least two sucking areas in the direction in which the PSA tape is peeled.

2. A semiconductor manufacturing apparatus comprising:

a peeling mechanism to peel a pressure sensitive adhesive (PSA) tape from a semiconductor wafer which has an element formation surface to form an element thereon, a rear surface opposite to the element formation surface and an adhesive layer formed on the entire rear surface and which are broken to be separated into semiconductor chips, the PSA tape adhering to the element formation surface of the semiconductor wafer;

wherein said peeling mechanism has a sucking section which have a porous member to hold the semiconductor wafer by suction and has a cutting device to cut the adhesive layer, said porous member being segmented into at least two sucking areas in the direction in which the PSA tape is peeled.

3. A semiconductor manufacturing apparatus comprising:

a peeling mechanism to peel a pressure sensitive adhesive (PSA) tape from a semiconductor wafer which has an

element formation surface to form an element thereon, a rear surface opposite to the element formation surface and an adhesive layer formed on the entire rear surface, the PSA tape adhering to the element formation surface of the semiconductor wafer;

wherein said peeling mechanism has a sucking section with a porous member to hold the semiconductor wafer by suction and has a cutting device to cut the semiconductor wafer into semiconductor chips together with the adhesive layer, said porous member being segmented into at least two sucking areas in the direction in which the PSA tape is peeled.

4. The semiconductor manufacturing apparatus according to claim 2,

wherein the semiconductor wafer further has a sealing resin formed on the element formation surface and a low dielectric constant insulation film formed on the sealing resin,

the PSA tape adheres to the element formation surface to the semiconductor wafer via the sealing resin and the low dielectric constant insulation film, and

said semiconductor manufacturing apparatus further comprises a heating device to fuse at least part of the low dielectric constant insulation film and the sealing resin so as to fix the low dielectric constant insulation film on the sealing resin.

5. The semiconductor manufacturing apparatus according to claim 4,

wherein said heating device fuses at least part of the low dielectric constant insulation film and the sealing resin by applying laser to the peripheral edge of the semiconductor chip with an incidence angle of 20° to 40°.

6. A semiconductor manufacturing apparatus comprising:

a peeling mechanism to peel a pressure sensitive adhesive (PSA) tape from a semiconductor wafer constituted by a plurality of semiconductor chips which are separated therefrom, each semiconductor chip having an element formation surface to form an element thereon and an adhesive layer formed on the element formation surface, the PSA tape adhering to the element formation surface of the semiconductor wafer via the adhesive layers;

wherein said peeling mechanism has a sucking section which have a porous member to hold the semiconductor wafer by suction, said porous member being segmented into at least two sucking areas in the direction in which the PSA tape is peeled.

7. A semiconductor manufacturing apparatus comprising:

a peeling mechanism to peel a pressure sensitive adhesive (PSA) tape from a semiconductor wafer which has an element formation surface to form an element thereon and an adhesive layer formed on the element formation surface, the PSA tape adhering to the element formation surface of the semiconductor wafer via the adhesive layer;

wherein said peeling mechanism has a sucking section with a porous member to hold the semiconductor wafer by suction and has a cutting device to cut the semiconductor wafer into semiconductor chips together with the adhesive layer, said porous member being segmented into at least two sucking areas in the direction in which the PSA tape is peeled.

8. A semiconductor manufacturing apparatus comprising:

a peeling mechanism to peel a pressure sensitive adhesive (PSA) tape from a semiconductor wafer which has an element formation surface to form an element thereon and an adhesive layer formed on the entire element formation surface and which are broken to be separated into semiconductor chips, the PSA tape adhering to the element

formation surface of the semiconductor wafer via the adhesive layer;

wherein said peeling mechanism has a sucking section which have a porous member to hold the semiconductor wafer by suction and has a cutting device to cut the adhesive layer, said porous member being segmented into at least two sucking areas in the direction in which the PSA tape is peeled.

9. A semiconductor manufacturing apparatus comprising:

a peeling mechanism to peel a pressure sensitive adhesive (PSA) tape from a semiconductor wafer which has an element formation surface to form an element thereon, the PSA tape adhering to the element formation surface of the semiconductor wafer;

wherein said peeling mechanism has a sucking section with a porous member to hold the semiconductor wafer by suction and has a cutting device to cut the semiconductor wafer into semiconductor chips, said porous member being segmented into at least two sucking areas in the direction in which the PSA tape is peeled.

10. The semiconductor manufacturing apparatus according to claim 1, which further comprises at least two systems of vacuum pipes to hold the semiconductor wafer by suction, said vacuum pipes being provided in association with said sucking areas of said porous member and alternatively switched therebetween in response to the position at which the PSA tape is peeled.

11. The semiconductor manufacturing apparatus according to claim 10,

wherein switching of said vacuum pipes is performed when the position at which the PSA tape is peeled approaches the adjacent sucking area.

12. The semiconductor manufacturing apparatus according to claim 1,

wherein the PSA tape is affixed to a wafer ring.

13. The semiconductor manufacturing apparatus according to claim 1,

wherein the PSA tape has a size substantially equal to or larger than the diameter of the semiconductor wafer.

14. The semiconductor manufacturing apparatus according to claim 1, which further comprises a suction collet which fixes each semiconductor chip by suction and picks up each semiconductor chip after the PSA tape is peeled.

15. A method of manufacturing a semiconductor device comprising:

peeling a pressure sensitive adhesive (PSA) tape from a semiconductor wafer constituted by a plurality of semiconductor chips which are separated therefrom, the semiconductor wafer having an element formation surface to form an element thereon and a rear surface opposite to the element formation surface, the PSA tape adhering to the element formation surface of the semiconductor wafer, each of the semiconductor chips having an adhesive layer formed on the rear surface thereof;

wherein said peeling of the PSA tape includes holding the semiconductor wafer via a porous member segmented into at least two sucking areas in the direction in which the PSA tape is peeled, by suction through at least two suction paths in association with the sucking areas of the porous member, said suction paths being alternatively switched when part of the PSA tape corresponding to adjacent sucking areas of said porous member is peeled off near the adjacent sucking area for next peeling in the direction in which the PSA tape is peeled.

16. A method of manufacturing a semiconductor device comprising:

peeling a pressure sensitive adhesive (PSA) tape from a semiconductor wafer which are separated into semiconductor chips, the semiconductor wafer having an element formation surface to form an element thereon, a rear surface opposite to the element formation surface and an adhesive layer formed on the entire rear surface, the PSA tape adhering to the element formation surface of the semiconductor wafer; and

cutting the adhesive layer so that the adhesive layer is separated for each semiconductor chip after the PSA tape is peeled;

wherein said peeling of the PSA tape includes holding the semiconductor wafer via a porous member segmented into at least two sucking areas in the direction in which the PSA tape is peeled, by suction through at least two suction paths in association with the sucking areas of the porous member, respectively, said suction paths being alternatively switched when part of the PSA tape corresponding to adjacent sucking areas of the porous member is peeled off near the adjacent sucking area for next peeling in the direction in which the PSA tape is peeled; and

said cutting of the adhesive layer is implemented in parallel to switching between said at least two suction paths in response to the state in which the adhesive layer is cut.

17. A method of manufacturing a semiconductor device comprising:

peeling a pressure sensitive adhesive (PSA) tape from a semiconductor wafer, the semiconductor wafer having an element formation surface to form an element thereon, a rear surface opposite to the element formation surface and an adhesive layer formed on the entire rear surface, the PSA tape adhering to the element formation surface of the

semiconductor wafer; and

cutting the semiconductor wafer into semiconductor chips together with the adhesive layer after the PSA tape is peeled;

wherein said peeling of the PSA tape includes holding the semiconductor wafer via a porous member segmented into at least two sucking areas in the direction in which the PSA tape is peeled, by suction through at least two suction paths in association with the sucking areas of the porous member, respectively, said suction paths being alternatively switched therebetween when part of the PSA tape corresponding to adjacent sucking areas of the porous member is peeled off near the adjacent sucking area for next peeling in the direction in which the PSA tape is peeled; and

said cutting of the semiconductor wafer and the adhesive layer is implemented in parallel to switching between said at least two suction paths in response to the state in which the semiconductor wafer and the adhesive layer are cut.

18. The method of manufacturing a semiconductor device according to claim 16,

wherein the semiconductor wafer further has a sealing resin formed on the element formation surface and a low dielectric constant insulation film formed on the sealing resin,

the PSA tape adheres to the element formation surface to the semiconductor wafer via the sealing resin and the low dielectric constant insulation film, and

said method of manufacturing a semiconductor device further comprises fusing at least part of the low dielectric constant insulation film and the sealing resin so as to fix the low dielectric constant insulation film on the sealing resin.

19. A method of manufacturing a semiconductor device comprising:

peeling a pressure sensitive adhesive (PSA) tape from a semiconductor wafer, the semiconductor wafer having an element formation surface to form an element thereon and an adhesive layer formed on the element formation surface, the semiconductor wafer having been broken to be separated into semiconductor chips; and

cutting the adhesive layer so that the adhesive layer is separated for each semiconductor chip after peeling the PSA tape;

wherein said peeling of the PSA tape includes holding the semiconductor wafer via a porous member segmented into at least two sucking areas in the direction in which the PSA tape is peeled, by suction through at least two suction paths in association with the sucking areas of the porous member, respectively, said suction paths being alternatively switched when part of the PSA tape corresponding to adjacent sucking areas of the porous member is peeled off near the adjacent sucking area for next peeling in the direction in which the PSA tape is peeled, and

said cutting of the adhesive layer is implemented in parallel to switching between said at least two suction paths in response to the state in which the adhesive layer is cut.

20. A method of manufacturing a semiconductor device comprising:

peeling a pressure sensitive adhesive (PSA) tape from a semiconductor wafer constituted by a plurality of semiconductor chips which are separated therefrom, each semiconductor chip having an element formation surface to form an element thereon and an adhesive layer on the element formation surface, the PSA tape adhering to the semiconductor wafer via the adhesive layers;

wherein said peeling of the PSA tape includes holding

the semiconductor wafer via a porous member segmented into at least two sucking areas in the direction in which the PSA tape is peeled, by suction through at least two suction paths in association with the sucking areas of the porous member, and

said suction paths are alternatively switched therebetween when part of the PSA tape corresponding to adjacent sucking areas of the porous member is peeled off near the adjacent sucking area for next peeling in the direction in which the PSA tape is peeled.

21. A method of manufacturing a semiconductor device comprising:

peeling a pressure sensitive adhesive (PSA) tape from a semiconductor wafer, the semiconductor wafer having an element formation surface to form an element thereon and an adhesive layer formed on the element formation surface, the PSA tape adhering to the element formation surface of the semiconductor wafer via the adhesive layers; and

cutting the semiconductor wafer into semiconductor chips together with the adhesive layer after the PSA tape is peeled;

wherein said peeling of the PSA tape includes holding the semiconductor wafer via a porous member segmented into at least two sucking areas in the direction in which the PSA tape is peeled, by suction through at least two suction paths in association with the sucking areas of the porous member, respectively, said suction paths being alternatively switched when part of the PSA tape corresponding to adjacent sucking areas of the porous member is peeled off near the adjacent sucking area for next peeling in the direction in which the PSA tape is peeled; and

said cutting of the semiconductor wafer and the adhesive layer is implemented in parallel to switching between said at least two suction paths in response to the state in which the adhesive layer and the adhesive layer are

cut.

22. A method of manufacturing a semiconductor device comprising:

peeling a pressure sensitive adhesive (PSA) tape from a semiconductor wafer, the PSA tape adhering to the semiconductor wafer; and

cutting the semiconductor wafer into semiconductor chips after the PSA tape is peeled;

wherein said peeling of the PSA tape includes holding the semiconductor wafer via a porous member segmented into at least two sucking areas in the direction in which the PSA tape is peeled, by suction through at least two suction paths in association with the sucking areas of the porous member, said suction paths being alternatively switched therebetween when part of the PSA tape corresponding to adjacent sucking areas of the porous member is peeled off near the adjacent sucking area for next peeling in the direction in which the PSA tape is peeled; and

said cutting of the semiconductor wafer is implemented in parallel to switching between said at least two suction paths in response to the state in which the semiconductor wafer is cut.

23. The method of manufacturing a semiconductor device according to claim 15,

wherein a plurality of through-holes are provided on the porous member.

24. The method of manufacturing a semiconductor device according to claim 15, which further comprises inserting a plate between the sucking areas of the porous member and the semiconductor wafer separated into semiconductor chips, the plate having suction holes corresponding to the semiconductor chips, respectively.

25. The method of manufacturing a semiconductor device according to claim 15, which further comprises sucking to pick up each semiconductor chip with a suction collet after the PSA tape is peeled.